Creation of innovative firms: a human capital perspective

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Abstract

The aims underlying this study are to analyse to what extent the generic human capital and specific human capital of the nascent entrepreneur influences the creation of the innovative firm. The results obtained through logistic regression show the first evidence, with regard to the creation of innovative firms, that more than a higher level of education or professional experience it is education in certain areas ("technical-scientific" and "managerial education areas") and industry experience that positively influences the creation of the firm. The use of the qualitative approach of human capital complements and refines previous research on the influence of the nascent entrepreneur's human capital on the creation of the firm.

Keywords: Human Capital; Innovative Start-ups; Nascent Entrepreneur; Creation of firm

1. Introduction

The creation of innovative firms – responsible for the introduction of new technologies, products, services and forms of organisation – is cited in the literature on entrepreneurship as one of the factors behind economic growth, creation of skilled jobs, market efficiency, renewal of the economic structure, spread of new technologies and improvement of the competitiveness of countries (Birch, 1987; Phillips and Kirchhofff, 1989; Acs and Audretsch, 1988; Acs and Audretsch, 1990; Reynolds et al., 1995; Wennekers and Thurik, 1999; Bednarzik, 2000; Carree and Thurik, 2003; Sarkar, 2007).

In tandem with the recognition of these contributions, there have been many unsuccessful attempts to create innovative firms which have floundered before entering the market (Aldrich, 2000).

Owing to the close link in the gestation phase between the capacity of the entrepreneurial enterprise and the knowledge and capacity of the individual involved in the process to create the firm, labelled the nascent entrepreneur in the literature, an explanation behind the success in creating the firm may lie in the differences in the nascent entrepreneur's human capital (Aldrich 2000; Deakins and Whitham, 2000). The nascent entrepreneur with more or better generic human capital, deriving from formal education and professional experience, or specific human capital, deriving from experience in industry, start-up experience or management experience, is likely to be more successful in setting up the firm.

The first empirical studies that related the nascent entrepreneur's human capital to the creation of the firm or which used human capital variables to explain the success / failure in creating the firm led to vague conclusions that did not focus solely on innovative firms, suggesting the need for further research.

Hence, the aim underlying this study is to analyse to what extent the generic human capital and specific human capital of the nascent entrepreneur influences the creation of the innovative firm.

This paper, anchored on the theory of human capital (Becker, 1975), intends to contribute to the knowledge on the influence of the nascent entrepreneur's human capital in the creation of the firm by using a more homogeneous sample than those used up until now (comprising of innovative nascent entrepreneurs), by refining the variables through a qualitative approach of human capital and by introducing variables not tested in previous studies. As such, we believe we can help clarify the lack of consistency in the results that the previous research arrived at about the influence of the nascent entrepreneur's human capital on the creation of the firm.

The remainder of our paper is structured as follows. In section 2 we briefly review the literature to contextualise the issue and outline the hypotheses that we intend to test. Section 3 describes the design and methodology of how the sample was compiled, the procedures used to obtain the data and the statistical analysis technique we implemented to test the hypotheses presented. The results of our analysis are presented in section 4. They are discussed in section 5 and the implications, limitations and suggestions for future research are outlined in section 6.

2. Literature and hypotheses

The importance the nascent entrepreneur's formal education for the creation of the firm can be viewed from two angles: acquisition of skills and acquisition of credentials. The skills learned in formal education may help to avoid common errors and provide backup for the steps that have to be taken to set up the firm. Formal education can also make it easy to access certain social networks which are extremely useful to acquire the different resources and is also an indicator used in the assessment made by outside financers (Cressy, 1996; Deakins and Hussain, 1994). Professional experience gives individuals the opportunity to learn business skills that they can implement in carrying out the various tasks involved in the start-up process (Van Gelderen et al., 2005). The prior execution of a wide variety of functional activities by the nascent entrepreneur can make an important contribution in the start-up process (Cooper, 1985).

However, empirical studies far from confirm this positive correlation between generic human capital and the creation of the firm. Davidsson and Honig (2003) did not find the

existence of a positive relation between "years of education" and "years of work experience" and the dependent variables of the model they used to ascertain success in the firm's creation. Also Van Gelderen et al. (2005) concluded that the "low/high education" and "work experience" variables are not useful to distinguish between successful and unsuccessful nascent entrepreneurs. Only Montgomery et al. (2005) obtained results that indicate that the level of education of the nascent entrepreneur increases the probability of creation of business.

It is pointed out, however, that prior studies all use the quantitative perspective of human capital and generic samples of nascent entrepreneurs (innovative and non-innovative). These research options may influence the results obtained. Bates (1995) says it is inappropriate to use samples that come from very different sectors of activity as this may confuse the results. Dimov and Shepperd (2005) recommend the application of the qualitative approach of human capital in contexts where a high level of human capital dominates as they believe the distinction between the education fields can have a much more important impact than the number of years (or level) of education. Also noteworthy is that Colombo and Grilli (2005), in a study with a sample of technology-based firms, found that two education backgrounds of the founders have a big impact on the performance of the firm ("technical and scientific" and "management"), while an identical relation was not found with the level of education in other fields. Other authors mention that the performance of the firm will also benefit from prior experience of the founder in different functional areas (Cooper, 1985; Sykes, 1986; Milliken and Vollrath, 1991) or specifically in the financial and sales/marketing areas (Sykes, 1986; Hood and Yong, 1993).

In the study on the creation of innovative firms, where there is a predominance of a high level of generic human capital, we admit that it may be important to distinguish between the nascent entrepreneurs with and without post-graduate education and take into consideration the aforementioned points about the qualitative aspects of education and professional experience. These aspects, which are not included in prior studies on the influence of the entrepreneur's human capital in the creation of the firm, lead us to put forward the following hypotheses:

Hypothesis 1.1. The nascent entrepreneur's post-graduate education positively influences the creation of the innovative firm.

Hypothesis 1.2. Higher education of the nascent entrepreneur in the management field positively influences the creation of the innovative firm.

Hypothesis 1.3. Higher education of the nascent entrepreneur in the technical or science field positively influences the creation of the innovative firm.

Hypothesis 1.4.The number of years of the nascent entrepreneur's professional experience positively influences the creation of the innovative firm.

Hypothesis 1.5. The nascent entrepreneur's prior professional experience in different functional areas positively influences the creation of the innovative firm.

Prior experience in industry can be very useful not only in the perception but also in the assessment and development of new business ideas. Industry experience gives the nascent entrepreneur the chance to understand the specific market forces of the industry and to identify potential market opportunities to exploit. This kind of human capital may give the nascent entrepreneur better knowledge of the markets it intends to operate in, and ways of serving the markets and needs of the customers, all important factors in the process to identify and exploit opportunities (Shane, 2000). Moreover, experience in industry increases the likelihood of individuals obtaining positions within the various social networks that may be important to obtain information about the market, access to funding, employee recruitment and establishment of relations with customers and suppliers.

The empirical studies published hitherto that relate the entrepreneur's human capital to the creation of the firm do not distinguish professional experience inside and outside industry, limiting themselves to the single variable of "years of work experience" (Davidisson and Honig, 2003; Van Gelderen et al., 2005).

We consider that nascent entrepreneurs who are creating a firm in a sector of activity that they have experience of may have acquired pertinent skills for the start-up process. Furthermore, these nascent entrepreneurs are more likely to have developed relationship networks with suppliers, customers, financial institutions, etc. The industry experience also gives them credibility when dealing with potential investors, and increases their expertise in obtaining credit and attracting other forms of cooperation.

Hypothesis 2.1. The nascent entrepreneur's experience in industry positively influences the creation of the innovative firm.

Previous start-up experience (successful or unsuccessful) can provide the nascent entrepreneur with experience in making decisions involved in the start-up process. Previous start-up experience also provides nascent entrepreneurs with the necessary know-how to carry out the tasks required to set up the firm and a benchmark to make a decision about certain options leading to a faster start-up process (Davidsson e Honig, 2003). Previous start-up experience provides the entrepreneur with valuable knowledge about how to create and finance new firms, how to recruit and manage employees, and how to attract customers. Previous start-up experience may help the nascent entrepreneur to overcome the traditional obstacles facing business start-ups (Shane and Khurana, 2003), thus increasing the chance that these individuals to exploit the opportunities they discover (Shane, 2003).

The empirical studies that relate the entrepreneur's previous start-up experience and the creation of firm return contradictory results. Davidsson and Honig (2003) found a positive correlation between this variable and the start-up process in terms of progress of start-up

activities but not in "obtaining sales and achieving profitability". Van Gelderen et al. (2005) did not confirm this influence among the nascent entrepreneurs that made up their sample.

Despite the contradictory results obtained in the empirical studies referring to the influence of previous start-up experience on the creation of firm, and some disagreement in the results obtained in the analyses referring to survival (Westhead, 1995; Watson et al., 1998; Bates, 1990; Bruderl et al., 1992; Gimeno et al., 1997) and performance (Cooper, 1981; Cooper et al., 1989; Duchnesneau and Gartner, 1990; Gimeno et al., 1997; Honig, 1998; Colombo and Grilli, 2005; Chandler and Jansen, 1992), we admit that the nascent entrepreneurs with previous start-up experience may have an advantage in relation to novice because of the knowledge obtained in previous processes that help to overcome the traditional obstacles facing new business ventures.

Hypothesis 2.2. The nascent entrepreneur's previous start-up experience positively influences the creation of the innovate firm.

Prior management experience may provide the skills needed to coordinate and administer the different activities in the start-up process (Boden and Nucci, 2000). Prior management experience enhances many skills needed to develop a business opportunity, including planning, negotiating, managing, organising and communicating (Shane, 2003).

The positive relation between the prior management experience and the creation of the firm was confirmed based on generic samples by the studies of Davidsson and Honig (2003) and Van Gelderen et al. (2005). These show that this variable seems to have the biggest influence on the start-up process. Davidsson and Honig (2003) confirmed that there was a positive relation between "years of managerial experience" and progress of the start-up activities (not confirming the hypotheses that established a positive relation with "obtaining sales and achieving profitability"). Van Gelderen et al. (2005) also finds in a sub-sample corresponding "high-ambition" nascent entrepreneurs that "management experience" is relation to creation of the firm.

Prior management experience more than any other variable seems to be relevant for the creation of new firms. Therefore, we put forward the hypothesis that nascent entrepreneurs that previously performed management functions should have a better performance in carrying out different tasks linked to the start-up process.

Hypothesis 2.3. The entrepreneur's previous management experience positively influences the creation of the innovative firm.

3. Data and methods

3.1 Sample

Our study used a sample of nascent entrepreneurs[1] and involved two phases. The first identified a set of nascent entrepreneurs who were currently attempting to create an innovative firm[2]. In relation to these individuals and the respective business initiatives, the data concerning the independent variables and control variables of the model pertaining to the date of their identification were obtained.

These nascent entrepreneurs were then monitored for a period of time (26 months) at the end of which they answered a follow-up questionnaire to determine the results of their efforts for the creation of the firm [3]. The data obtained (second phase) were used to build the dependent variable of the model.

The initial sample we used in this study consisted of 476 nascent entrepreneurs (individuals and teams) who entered three innovative business ideas contests that took place in Portugal in the 2nd and 3rd quarters of 2004, organized by government entities under the aegis of the Ministry of the Economy.

In line with the way the sample was designed, the data was compiled from a survey carried out in two moments:

1) After identification of the nascent entrepreneur (2nd or 3rd quarter of 2004);

2) 26 months after this identification (3rd or 4th quarter of 2006).

The final sample that we used to check the influence of the nascent entrepreneur's human capital on the creation of the firm comprises of 131 nascent entrepreneurs (individuals and teams) who answered the follow-up interview.

3.2 Model

The research model used includes dependent binary variable devised to check the success in creating the firm, two groups of independent variables referring to the generic human capital and the specific human capital and a group of control variables.

The generic human capital is represented by variables related to the formal education and professional experience of the nascent entrepreneur and the specific human capital includes variables referring to industry experience, start-up experience and management experience.

In order to control the effects of other factors mentioned in the literature which, as well as the human capital of the entrepreneur, may influence the creation of innovative firm, we included the "patent or exclusivity licence", "team" and "planning" variables in the model.

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[1] We use the concept of the nascent entrepreneur as defined, among others, by Reynolds et al. (2004) and in the GEM (2004), who consider the nascent entrepreneur a person who is now trying to start a new business, who expects to be the owner or part owner of the new firm, who has been active in trying to start the new firm in the past 12 month, and whose start-up did not have a positive monthly cash flow that covers expenses and the owner-manager salaries for more than three months.

[2] Innovative firms are considered those that base their productive activity on an innovation or advancement in the productive or social environment that result in new products/services or processes, based on the application of the knowledge (OCDE, 2001).

[3] The association between the start-up of the firm and the first sale has been consistently used in the literature (Gatewood et al. 1995; Carter et al. 1996; Newbert, 2005), so we also used these criteria in this study.

The existence of a team is an important factor in the creation of the firm (Van Gelderen, 2005). Although increasing coordination and integration costs, (Ucbasaran et al. 2003) it increases the tangible and intangible resources available, often leads to more credibility in an entrepreneurial venture and allows more access to social networks that play an important role in obtaining resources (Roure and Maidique, 1986; Eisenhardt and Schoonhoven, 1990; Almus and Nerlinguer, 1999; Bruderl and Preisendorfer, 2000; Colombo and Grilli, 2005).

Business planning may help the founders of the firm to outline, coordinate and control the activities (Mintzberg, 1994). Several authors point out the importance of planning to ensure success in the creation of the firm. It leads to more effective distribution of resources during the start-up process, accelerates product development and organisation of the activities and helps to signal the possibilities for firm development to outsiders, which is especially important in a phase when there is no history of financial performance to serve as the basis for assessment (Castrogiovanni, 1996; Delmar and Shane, 2003).

According to Shane and Stuart (2002) patents or exclusivity licences may be important for the creation and success of the firm, and even is, according to Teece (1986), sometimes the main resource in the start-up phase.

3.2.1 Dependent variable

The binary variable "status" is coded "1" if the firm has been created and "0" in other cases (abandonment or still trying).

3.2.2 Independent variables

Generic human capital is usually represented through formal education and professional experience (Gimeno et al. 1997).

The formal education was made operational through the "education" variable as to the nascent entrepreneur's education and takes into account the fact that the instigators of innovative initiatives usually have a high level of academic education; hence a distinction is made between those whose education goes beyond degree level. For the nascent entrepreneur (or at least one member of the team) who has a post-graduation, master's degree or PhD this variable takes the value "1" and in the other cases it takes the value "0".

The professional experience describes whether the nascent entrepreneur is a graduate (degree, post-graduation, master's degree or PhD) in the essential areas for the innovative entrepreneurial ventures on the date of his identification. As in the study carried out by Colombo and Grilli (2005) regarding the influence of human capital on the performance of innovative technology-based firms, we distinguish the "management" area from the "technical and scientific" area, which were measured through the dichotomous variables "maneducation" and "techscieneducation". The former refers to whether the nascent entrepreneur (or at least a member of the team) has a degree, post-graduation, master's degree

or PhD in management. The latter reflects the existence of one of these degrees in engineering, physics, biology, chemistry, medicine, pharmacy or computer sciences. Therefore, if the individual nascent entrepreneur or at least one member of the team has a degree, post-graduation, master's degree or PhD in management the value of "1" is assigned and in all other cases the value is "0". Likewise, if the individual nascent entrepreneur or at least one member of the team has a degree, post-graduation, master's degree or PhD in a technical or scientific field the value of "1" is assigned and in all other cases the value is "0". These measures capture the predominance of certain education degrees in specific education areas that are considered the most relevant in the context of this study.

We selected two variables to assess the professional experience of the nascent entrepreneur. The first, "workexp", was made operational using the method implemented by Evans and Leighton (1989), Schoonhoven et al. (1990) and Bruderl et al. (1992) in similar studies to ours, using the number of years of full-time employment (or average number among the team members). The professional experience encompassed in this metric variable excluded professional experience obtained in management functions.

The second indicator, "funcdivers" considered the diversity of the functional areas in which the professional experience occurred. We used the classification of Gartner et al. (1999), who after excluding management and industry experience (specific human capital) admit that professional experience can occur in three major functional fields (Marketing / Sales; Finance and Accounting; Operations). The variable "funcdivers" was coded "1" if the nascent entrepreneur (or any member of the team) possessed professional experience in more than one functional field, and "0" in all other cases.

The specific human capital of the nascent entrepreneur was measured through three dichotomous variables: "industexp", "entrepexp" and "managexp". The variables pertaining to the specific human capital were coded "1" if the nascent entrepreneur (or at least one of the team members) had prior experience in entrepreneurial business industry, had been involved in the start-up of a new firm or had performed managerial or director-level functions, and were coded "0" when each of these kinds of experiences did not exist.

The data referring to all the independent variables refer to the date of identification of the nascent entrepreneur.

3.2.3 Control variables

To measure the strength and quality of the technological backup of the business initiative we used the variable "patent&exclic" whereby "1" was attributed if the business initiative had at least one patent or exclusivity licence and "0" in all other cases.

As in studies on topics similar to ours by Pennings et al. (1998) and Tornikoski and Newbert (2006), we also use the dichotomous variable "team" whereby we attributed the value "1" to entrepreneurial ventures carried out by a nascent entrepreneur (team) and "0" to those carried out by an individual nascent entrepreneur (individual).

The variable “Planning” was defined as follows: if the nascent entrepreneur on the date of his/her identification had written a detailed formal business plan or financial forecasts together with the compilation of information on potential clients, suppliers and competitors the value “1” was attributed. In all other cases it was “0”.

The data referring to all the control variables refer to the date of identification of the nascent entrepreneur.

4. Results

4.1 Descriptive Statistics

The 131 nascent entrepreneurs who comprised the sample used in this study were broken down into the following sectors: Industry (35.1%), Services (38.9%), Transport and Commerce (11.5%), Energy (9.2%) and Tourism (5.3%) and based the creation of their firms on an innovative product or service (79.4%) process (14.6%) or commercialization (3.8%).

Table 1 shows the characteristics of the sample and the result of their efforts to create a firm. 44% had a post-graduation, masters’ degree or PhD, and an average of 5.81 years of professional experience, obtained in more than one functional area in 21% of cases.

Table 1 - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Status (d.p.)	131	0	1	,48	,502
Education	131	0	1	,44	,499
Maneducation	131	0	1	,29	,456
Techscieneducation	131	0	1	,65	,479
Workexp	131	0	24	5,81	4,913
Funcdivers	131	0	1	,21	,406
Industexp	131	0	1	,57	,497
Entrepexp	131	0	1	,31	,462
Managexp	131	0	1	,45	,499
Team	131	0	1	,57	,497
Planning	131	0	1	,27	,444
Patent&ExcLic	131	0	1	,31	,462
Valid N (listwise)	131				

A total of 29% of nascent entrepreneurs had undertaken higher education in the field of management while 65% had studied a technical or scientific subject in higher education.

It is also pointed out that a high number of nascent entrepreneurs possessed prior industry experience (57%) and experience in management functions (45%). Only 31% of the nascent entrepreneurs of this sample had prior start-up experience.

The existence of a patent and/or exclusivity licence as technological support for the business initiatives was mentioned by 31% of the sample members.

A nascent entrepreneur "team" dominates, representing about 57% of the sample, against 43% of the "individual" nascent entrepreneur.

On the date of identification around ¼ of the nascent entrepreneurs had made detailed formal plans (writing a business plan or collecting detailed information about the market and competition together with the drawing up of financial forecasts).

Finally it is pointed out that more than half the nascent entrepreneurs that made up the sample were not successful in setting up an innovative firm. Twenty-six months after their identification only 48% had created the firm. The remaining 52% had definitively abandoned the process or were still trying to set up the firm.

4.2 Multivariate analysis

The hypotheses formulated in our study require binary dependent variable and a set of dichotomous and continuous explicative variables. Owing to its similarity with regression and because it does not require distributional assumptions for the data and equality of variance matrices between the groups – characteristics not found in any of the situations – we preferred to use binominal logistic regression in this study (Hair et al., 1998; Sharma, 1996).

Version 14.0 of the Statistical Package for the Social Sciences (SPSS) was used to analyse the logistic regression.

Annex 1 presents the matrix of correlations between the independent and control variables used in the model. Although some of the correlations are significant they are not high enough (none is higher than 0.6), which leads us to conclude that the question of multicollinearity does not arise among the variables of the model used in our study.

The logistic regression analysis proved to be a statistically significant model (difference test / chi-square = 81.900, df = 11, p = 0.000). The result of the Hosmer-Lemeshow test (chi-square = 9.855; df = 8; p = 0.275) confirmed that the model fits the data. The classification table indicates that the model correctly classifies in 84% of cases. According to the Nagelkerke R Square, the dependent variable variance explained by the model is 62%.

Analysis of table 2 enables identification of the significant Wald coefficients in three variables of human capital ($p<0.05$): "techscieneducation" (B = 2.728; p = 0.000), "maneducation" (B = 1.822; p =0.014) and "industexp" (B = 1.143; p = 0.048) which are thus able to predict the creation of the firm. The first two refer to the generic human capital while the third refers to a variable of specific human capital. .

The generic human capital variables "education", "funcdivers" and "workexp" and the specific human capital variables ("entreprexp" and "managexp") also used in the model, do not exceed the fixed statistical significance limit ($p<0.05$).

The evidence obtained through this model backs up three of the hypotheses that associated the human capital and the firm creation (hypotheses 1.2, 1.3. and 2.1). Hypotheses 1.1, 1.4, 1.5, 2.2 and 2.3 were not confirmed.

Table 2 - Results of logistic regression analysis

	B	S.E.	Wald	df	Sig.	Exp(B)
Education	,058	,557	,011	1	,916	1,060
Maneducation	1,822	,742	6,023	1	,014	6,186
Techscieneducation	2,728	,726	14,128	1	,000	15,303
Workexp	-,020	,072	,078	1	,780	,980
Funcdivers	1,032	,810	1,623	1	,203	2,808
Industexp	1,143	,578	3,913	1	,048	3,135
Entrepexp	,546	,789	,479	1	,489	1,726
Managexp	-,152	,704	,047	1	,829	,859
Team	,023	,591	,001	1	,969	1,023
Planning	2,255	,738	9,339	1	,002	9,536
Patent&ExcLic	,676	,593	1,301	1	,254	1,966
Constant	- 4,027	,856	22,146	1	,000	,018
Model chi-square	81,900 (.000)					
df	11					
Nagelkerke R^2	0.62					
Hosmer & Lemeshow test	9,855 (0,275)					
df	8					
% correct predictions	84%					

a Variable(s) entered on step 1: Education, Maneducation, Workexp, Funcdivers, Industexp, Entrepexp, Managexp, Team, Planning, Patent&ExcLic.

*4.2.3 Control variables***.**

As regards the control variables, we point out that the "Planning" variable registered a significant level in the model which reveals that the nascent entrepreneurs who planned their activities early obtained more success in the creation of the innovative firm.

5. Discussion

In general the results obtained suggested that the nascent entrepreneur's generic human capital made an important contribution towards the creation of the innovative firm (two of the five hypotheses were confirmed). A detailed analysis of the results enables one to arrive at several conclusions about this contribution. First, it is the difference in the nascent entrepreneur's formal education that is relevant for the creation of the innovative firm and not

the difference in professional experience (number of years and heterogeneity). Second, the results suggest that post-graduate education was not sufficient for the nascent entrepreneur to have success in setting up the firm. This education has to be in certain fields of knowledge ("technical and scientific" and "management"). Third, one can conclude that the contribution of higher education in the "technical and scientific" field is more relevant than higher education in the area of "management" for the setting up of the innovative firm.

This positive relation between the variables of formal education and the creation of the firm was not found in previous studies carried out by Davidsson and Honig (2003), Van Gelderen et al. (2005) and Montgomery et al. (2005). One explanation for this divergence may be the difference in the sample (innovative nascent entrepreneurs versus nascent entrepreneurs in general) which enables one to surmise that formal education does not influence the creation of all kinds of firms but only the creation of innovative firms. Another justification for the result may be in the kind of approach and variables used. While in our study we used qualitative and quantitative variables, the previous studies used only quantitative variables.

It is interesting to note that other studies also confirmed the importance of higher education of the founders in the "technical and scientific" and "management" fields for the survival and performance of the innovative firm (Roberts, 1991; Hood and Young, 1993; Almus and Nerlinger, 1999; Colombo and Grilli, 2005). The overall results of our study with regard to the survival and performance of the innovative firm empirically backs up the idea that the qualitative differences of the generic human capital are relevant for the creation, survival and performance of the firm.

As regards specific human capital the results of our study enable one to conclude that the nascent entrepreneurs with experience in industry have more chance of succeeding in the creation of the firm than those that do not have experience in industry. Previous results (Davidsson and Honig, 2003; Van Gelderen et al., 2005; Montgomery et al., 2005) do not include any variable for experience in industry in the respective models so it is impossible for us to compare results. It is therefore legitimate to admit that we have found the first empirical evidence to support the thesis that the nascent entrepreneur's experience in industry influences the creation of the innovative firm.

The hypotheses to establish positive relations between variables referring to previous start-up experience and management experience and the creation of the innovative firm were not confirmed.

With regard to previous start-up experience, the result obtained in identical to that is the studies carried out by Davidsson and Honig (2003) and Van Gelderen et al. (2005) undertaken with samples of generic nascent entrepreneurs and which also did not confirm a positive influence of this variable on the creation of the firm. Given that no influence was found between previous start-up experience and the creation of firm in studies with two

different samples (generic and innovative), the theoretical argument expounded in the literature that previous start-up experience plays and important role in the creation of a new firm is weakened.

It was also not confirmed that the nascent entrepreneur's management experience has an impact in the creation of the innovative firm. The absence of the influence of this variable had already been noted by Davidsson and Honig (2003) but diverged from the conclusion arrived at by Van Gelderen et al. (2005) when he analysed a sub-sample of nascent entrepreneurs with "high ambition", where this variable was found to be positively related to the creation of the firm. The results we obtained lead us to speculate that the absence of a positive relation between management experience and creation of the innovative firm may be down to the fact that some of these initiatives counted on the participation of venture capital investors who possessed "management" skills, thus compensating the nascent entrepreneur's lack of these skills. This possible explanation requires further research to be confirmed.

Broadening the discussion of the results to similar studies to ours (influence of specific human capital on the survival and performance of the firm) where industry experience is positively relation both to survival and the performance of the firm (Cooper and Bruno, 1977; Bruderl et al., 1992; Cooper et al., 1994; Siegel et al., 1993; Gimeno et al., 1997; Colombo and Grilli, 2005) and the variables referring previous start-up experience and management experience are only closely linked to performance (Bates, 1990; Bruderl et al., 1992;Gimeno et al., 1997;Westhead,1995; Cooper et al., 1989; Duchesneau and Gartner, 1990; Stuart and Abetti, 1990; Peña, 2002; Colombo and Grilli; 2005; Cooper, 1981; Honig, 1998), we accept that management experience and previous start-up experience may have less influence on the creation and in the firm's start-up phase (survival) and more influence in a later phase where the question of performance comes into play. This pattern is not followed by the variable referring to industry experience that seems to have a positive and consistent influence both in the process of creation, and after the creation of the firm (survival and performance).

6. Implications, limitations and future research

6.1 Implications

Using a sample of innovative nascent entrepreneurs we explored the qualitative nature of human capital by analysing the influence of some specific domains of education and experience in relation to the creation of the firm.

The use of the qualitative approach of human capital (never before used in the study of the influence of the nascent entrepreneur's human capital on the creation of the firm) allowed us to conclude that some kinds of generic human capital ("technical and scientific" and "management") and the variable of specific human capital "experience in industry" (not tested previously) contribute to the creation of the innovative firm.

These results complement and refine previous research on the influence of the nascent entrepreneur's human capital on the creation of the firm. Understanding the connection between the nature of the human capital and creation of the innovative firm enlarges the theoretical base. The major role of the qualitative approach in this study should be taken into account in future research on the influence of the nascent entrepreneur's human capital in the creation of the firm. Comparing the results obtained with that of other studies backs up the thesis that the influence of the nascent entrepreneur's human capital varies in accordance with the kind of nascent entrepreneurs included in the sample, and it is recommended that future analyses take this into consideration.

The results obtained indicate that certain kinds of human capital positively influence the creation of the innovative firm. Nascent entrepreneurs that do not have this knowledge or skills should take this factor into account as it may be a disadvantage for them. They should try to overcome it by assembling teams with profiles that help to create the firm or seek suitable consultancy to increase the chances of success.

Knowledge of the variables of the human capital that help the nascent entrepreneurs to set up the firm and obtain outside financing is equally useful for government agencies concerned with encouraging innovative entrepreneurship. These agencies can take into consideration these results in drawing up their support programmes, for example by including professional training modules that try to overcome the absence of knowledge and skills identified as relevant for the creation of the firm and access to outside financing.

6.2. Limitations and future research

We believe that the results obtained in this study make a contribution to understanding the role played by the human capital of the nascent entrepreneur in the creation of the innovative firm. However, as with all research, there are several limitations. We now outline some of these limitations as well as the possible avenues of future research.

The results obtained refer specifically to a given context (Portugal). To ascertain whether our conclusions can be generalised to other contexts further research is necessary in other countries to validate our results.

The sample comprises nascent entrepreneurs identified from contests held for innovative business ideas. On the date of this identification there may have been significant differences among the nascent entrepreneurs as regards the time spent in preparing their businesses. In future research an effort can be made to identify a random sample with greater homogeneity in relation to the time dedicated by the nascent entrepreneur to the creation of the business.

The size of the sample does not allow it to be divided. An effort to identify and monitor a sample of sufficient size that can be divided (e.g. between nascent entrepreneurs with radical innovations and nascent entrepreneurs with incremental innovations) is another suggestion that we put forward for future work.

Despite the considerable number of variables used, only the direct effects were studied, and other more difficult variables to assess were not included. Future studies can study the indirect effects and incorporate other explicative variables that the theory suggests may be related to the creation and initial financing of the firm (e.g. personal wealth or guarantees that the nascent entrepreneur may provide).

We believe that the effort we made to understand the role the human capital of the nascent entrepreneur plays in the creation of the innovative firm will continue to be the object of research. We hope that the results obtained in our study, albeit with the obvious limitations entailed in any research, can encourage undertaking of the future work needed in this field.

Annex 1 - Correlation Matrix

		1.	2	3.	4	5.	6.	7.	8.	9.	10.	11.
1. Education	Pearson Correlation	1										
	Sig. (2-tailed)											
2. Maneducation	Pearson Correlation	,141	1									
	Sig. (2-tailed)	,107										
3.Techscieneducation	Pearson Correlation	,398(**)	,047	1								
	Sig. (2-tailed)	,000	,591									
4. Workexp	Pearson Correlation	,261(**)	,176(*)	,233(**)	1							
	Sig. (2-tailed)	,003	,044	,007								
5. Funcdivers	Pearson Correlation	,154	,464(**)	,217(*)	,217(*)	1						
	Sig. (2-tailed)	,080	,000	,013	,013							
6. Industexp	Pearson Correlation	,149	,042	,237(**)	,401(**)	,250(**)	1					
	Sig. (2-tailed)	,090	,631	,006	,000	,004						
7. Entrepexp	Pearson Correlation	,010	,197(*)	,175(*)	,304(**)	,236(**)	,238(**)	1				
	Sig. (2-tailed)	,913	,024	,045	,000	,007	,006					
8. Managexp	Pearson Correlation	,120	,233(**)	,216(*)	,352(**)	,221(*)	,224(*)	,566(**)	1			
	Sig. (2-tailed)	,173	,007	,013	,000	,011	,010	,000				
9. Team	Pearson Correlation	,242(**)	,042	,399(**)	,020	,250(**)	,127	,238(**)	,255(**)	1		
	Sig. (2-tailed)	,005	,631	,000	,822	,004	,149	,006	,003			
10. Planning	Pearson Correlation	,295(**)	,184(*)	,372(**)	,302(**)	,332(**)	,034	,199(*)	,286(**)	,278(**)	1	
	Sig. (2-tailed)	,001	,035	,000	,000	,000	,704	,023	,001	,001		
11. Patent&ExcLic	Pearson Correlation	,110	,161	,175(*)	,141	,236(**)	,070	,028	,099	-,030	,311(**)	1
	Sig. (2-tailed)	,212	,067	,045	,108	,007	,425	,748	,258	,732	,000	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

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